

What is claimed is:

1. A rotary engine comprising

a housing having a first and second intersecting cavity disposed therein, the first and second cavities including cylindrical wall surfaces;

a rotor rotatably mounted in the first cavity, the housing and the rotor defining an annular chamber disposed therebetween, the rotor including a piston extending from the rotor into the annular chamber;

a first valve rotatably mounted in the second cavity, the first valve having a circumference and recess sized to accommodate the piston during a rotation of the rotor; and

at least one passage comprising an open portion formed in the cylindrical wall surface of the second cavity and an enclosed portion enclosed by the housing along a length of the enclosed portion, the open portion including a leading end and a trailing end with respect to a direction of rotation of the first valve and which open portion extends for at least about 20 degrees around a circumference of the cylindrical wall surface of the second cavity, and wherein the enclosed portion connects the open portion to the annular chamber downstream of the second cavity relative to a direction of rotation of the rotor.

2. The rotary engine according to claim 1 wherein the open portion extends for at least about 90 degrees around the circumference of the second cavity.

3. The rotary engine according to claim 1 wherein the open portion extends for at least about 180 degrees around the circumference of the second cavity.

4. The rotary engine according to claim 1 wherein a distance between the trailing end of the open portion and the intersection of the first and second cavities located on a downstream side of the second cavity with respect to the direction of rotation of the first valve is greater than a width of the recess at the circumference of the first valve.

5. The rotary engine according to claim 4 wherein a distance between the leading end of the open portion and the intersection of the first and second cavities located on an upstream side of the second cavity with respect to the direction of rotation of the

first valve is greater than a width of the recess at the circumference of the first valve.

6. The rotary engine according to claim 1 further comprising

- a third cavity disposed in the housing and intersecting the first cavity;
- a second valve rotatably mounted in the third cavity;
- at least one intake port disposed within the annular chamber;
- at least one exhaust port disposed within the annular chamber; and
- wherein a flow of gases through the intake port and the exhaust port is varied by the second valve.

7. The rotary engine according to claim 1 further comprising at least one fuel injection port opening into the second cavity wherein a fuel may be injected through the fuel injection port into the recess in the first valve.

8. The rotary engine according to claim 7 further comprising at least one ignition port opening into the second cavity and adjacent to an end face of the first valve.